Exercise on R Markdown

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R Markdown is a file format for making dynamic documents that integrate code, output, graphs and text. Actually, the pdf document that you are looking at has been generated with R Markdown. This exercise will get you started and show a few of the many, many features with R Markdown. The R Markdown cheatsheet may be useful for you to get started with R Markdown.

Markdown files, knitting

1. Install the `rmarkdown` package via the *Packages* menu or with the command

   ```
   install.packages("rmarkdown")
   ```

2. Open a new R Markdown document (*File* → *New File* → *R Markdown*). If you are asked to install some extra packages, then answer "yes". You are asked for a title; just write *Test* or whatever you want. Save the document; use file extension .Rmd, if you don't let the computer choose it for you.
3. Verify that you can knit the document with the example content: Click on the *Knit* button in the console toolbar (the one with the blue wool and knitting needles), and an example output file should be generated.
4. Edit the title of the markdown document to *My first Markdown document*, and click *Knit* again. Notice how the title of the output document changes.

Notice that, as soon as the output html file is generated, you can view it with any browser (without starting RStudio). Your work is therefore easily shared with collaborators that don't use R themselves.

R chunks and text

5. Delete the example content in the markdown document from line 12 and down. Insert a new R chunk by clicking on the *Insert* button in the editor toolbar (the button with a white *C* in a green square), and choosing *R*. For instance, type

   ```
   3+2
   log10(0.001)
   z <- 17
   ```

   inside the chunk. Don't knit yet! Instead: What happens when you click the little green "play" button to the right of the chunk?
6. You can also run each line (the one at the blinking cursor) one at a time with *Ctrl + Enter*. Try it.

As you may already have noticed, it takes a few seconds to knit your document, even if it is very small. It is therefore recommended that you **run your R commands/chunks without knitting until they are as they should be**. You just saw how to do that.

7. Knit the document, and notice what the R chunk has now generated.

8. Click the small wheel next to the R chunk, and select *Show output only* in the dropdown menu denoted *Output*. Knit the document, and notice what happens in the output. Obviously, the different options can be used to control the outout from an R chunk. You may switch back to *Use document defaults* again.
9. Add the text *Some simple computations in R* above the chunk, and knit the markdown document again.
10. Insert a line above the text, starting with two hashtags and followed by some text, e.g. `## My header`. Knit, and see what happens.
11. Insert a chunk with the following code, knit, and see what happens:

```
x <- c(1,2,3,4)
y <- c(2,6,3,1)
plot(y ~ x)
```

Word or pdf output

12. Notice the line `output: html_document` in the beginning of the Rmd file. It implies that output is written to a html-file. If you have MS Word installed, then it is easy to have the output generated as a docx-file instead: Simply write `word_document` instead of `html_document`. Try it!
13. If you prefer pdf-output, you write `pdf_document`, but you need to install a version of the TeX program at your computer: MikTex for Windows, MacTeX for mac. If you knit without having TeX installed, then you get an error message which includes links for installation of TeX. Notice that, for MikTex it says that it is important to choose *Complete* rather than *Basic* installation, but that appears not to be possible. Fortunately, the problen can be fixed: When you are asked if you want to *Install packages on the fly*, then answer *Yes* rather than *Ask me first*. You must restart RStudio when you have installed TeX (before you can knit to pdf).

Advice and good practice

- Don't knit all the time. Instead, run code lines and R chunks without knitting while you are figuring out how they should be.
- Do not put all your R commands into one big R chunk. Instead, split it into well-defined smaller chunks, which you may even give names. Investing effort in choosing good chunk names will pay off in terms of structuring your R code.
- The code in Rmd-file must be self-contained in the sense that you cannot use datasets (or other objects) that you have imported "outside" the Rmd-file. You therefore have to include the commands for data import in the file.
- If no output is generated, then read the error message. It is not always easy to read for a beginner, but at least you are informed where the problem occurs.
- It is possible to "cache" R trunks such that the commands are not rerun every time you knit. This is a nice feature if you have time consuming computations.
- As always: Make sure to organize your file in an appropriate way, save the file often, and make sure to save only relevant commands (not all the stuff you played around with at preliminary stages).
- You can open the files in other programs than RStudio, e.g. your favourite browser for html-files or your favourite pdf viewer for pdf-files.
- Finally, but not the least: You don't necessarily want to use R Markdown! Using old fashioned R scripts in many aspects provides a much more light weight interface to R. You can open an R script via *File → New File → R Script*.